DLAT gene

dihydrolipoamide S-acetyltransferase

Normal Function

The *DLAT* gene provides instructions for making the E2 enzyme (also known as dihydrolipoamide acetyltransferase), which is part of a large group of proteins called the pyruvate dehydrogenase complex. This complex comprises multiple copies of three enzymes, including E2, and several related proteins. The E2 enzyme is the core to which the other proteins attach to form the complex.

The pyruvate dehydrogenase complex plays an important role in the pathways that convert the energy from food into a form that cells can use. This complex converts a molecule called pyruvate, which is formed from the breakdown of carbohydrates, into another molecule called acetyl-CoA. The E2 enzyme performs one part of this chemical reaction. The conversion of pyruvate is essential to begin the series of chemical reactions that produces adenosine triphosphate (ATP), the cell's main energy source.

Health Conditions Related to Genetic Changes

Leigh syndrome

pyruvate dehydrogenase deficiency

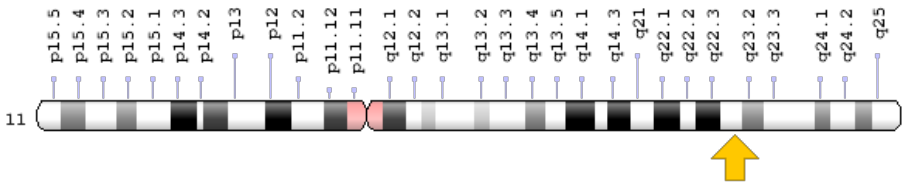
At least two mutations in the *DLAT* gene have been identified in individuals with pyruvate dehydrogenase deficiency; mutation of the *DLAT* gene is a very rare cause of this condition. Pyruvate dehydrogenase deficiency is characterized by a potentially life-threatening buildup of a chemical called lactic acid in the body (lactic acidosis), delayed development, and neurological problems.

Mutations in the *DLAT* gene lead to an abnormal E2 enzyme and reduced activity of the pyruvate dehydrogenase complex, although the mechanism is unclear. With decreased activity of this complex, pyruvate builds up and is converted, in another chemical reaction, to lactic acid, causing lactic acidosis. In addition, the production of cellular energy is diminished. The brain, which is especially dependent on this form of energy, is severely affected, resulting in the neurological problems associated with pyruvate dehydrogenase deficiency.

Chromosomal Location

Cytogenetic Location: 11q23.1, which is the long (q) arm of chromosome 11 at position 23.1

Molecular Location: base pairs 112,024,814 to 112,064,278 on chromosome 11 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- 70 kDa mitochondrial autoantigen of primary biliary cirrhosis
- dihydrolipoamide acetyltransferase component of pyruvate dehydrogenase complex
- dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex, mitochondrial
- DLTA
- E2 component of pyruvate dehydrogenase complex
- M2 antigen complex 70 kDa subunit
- ODP2_HUMAN
- PBC
- PDC-E2
- PDCE2
- pyruvate dehydrogenase complex component E2

Additional Information & Resources

Educational Resources

- Biochemistry (fifth edition, 2002): The Formation of Acetyl Coenzyme A from Pyruvate
  https://www.ncbi.nlm.nih.gov/books/NBK22427/#A2376
- Biochemistry (fifth edition, 2002): The Pyruvate Dehydrogenase Complex Is Regulated Allosterically and by Reversible Phosphorylation
  https://www.ncbi.nlm.nih.gov/books/NBK22347/#A2410
- Molecular Biology of the Cell (fourth edition, 2002): Sugars and Fats Are Both Degraded to Acetyl CoA in Mitochondria
  https://www.ncbi.nlm.nih.gov/books/NBK26882/#A300
- Molecular Cell Biology (fourth edition, 2000): Mitochondrial Oxidation of Pyruvate Begins with the Formation of Acetyl CoA
  https://www.ncbi.nlm.nih.gov/books/NBK21624/#A4352

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28DLAT%5BTIAB%5D%29+OR+%28dihydrolipoamide+S-acetyltransferase%5BTIAB%5D%29%29+OR+%28%28DLTA%5BTIAB%5D%29+OR+%28E2+component+of+pyruvate+dehydrogenase+complex%5BTIAB%5D%29+OR+%28PDC-E2%5BTIAB%5D%29+OR+%28PDCE2%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

OMIM

- DIHYDROLIPOAMIDE S-ACETYLTRANSFERASE
  http://omim.org/entry/608770

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_DLAT.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=DLAT%5Bgene%5D
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=2896

- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/1737
- UniProt
  http://www.uniprot.org/uniprot/P10515

Sources for This Summary

- Biochemistry (fifth edition, 2002): The Formation of Acetyl Coenzyme A from Pyruvate
  https://www.ncbi.nlm.nih.gov/books/NBK22427/#A2376
- OMIM: DIHYDROLIPOAMIDE S-ACETYLTRANSFERASE
  http://omim.org/entry/608770
- Head RA, Brown RM, Zolkipli Z, Shahdadpuri R, King MD, Clayton PT, Brown GK. Clinical and genetic spectrum of pyruvate dehydrogenase deficiency: dihydrolipoamide acetyltransferase (E2) deficiency. Ann Neurol. 2005 Aug;58(2):234-41.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16049940
- Patel MS, Korotchkina LG, Sidhu S. Interaction of E1 and E3 components with the core proteins of the human pyruvate dehydrogenase complex. J Mol Catal B Enzym. 2009 Nov 1;61(1-2):2-6.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20160912
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770179/

Reprinted from Genetics Home Reference:
https://ghr.nlm.nih.gov/gene/DLAT

Reviewed: July 2012
Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services